

REMARKS/ARGUMENTS

Reconsideration of this application is requested. Claims 1, 3-6, 10-14 and 17-32 will be pending in the application subsequent to entry of this Amendment.

Amendments to the Claims

Claim 1 has been amended to specify that the milling fluid is both solvent and water miscible. Basis for this amendment can be found at page 4, lines 1 to 2. Claim 1 has also been amended to delete glycols from the list of milling fluids. Finally, two typographical errors have been corrected in claim 1: ("fluids" to "fluid" and "either" to "ether").

Claim 13 has been amended for consistency with claim 1 by deleting the glycols from the list of preferred milling fluids (page 6, lines 5 to 9 of the description sets out which of the preferred milling fluids are glycols).

Response to Prior Art-Based Rejections

Previous claims 1, 4 to 6, 12 to 13, 17 to 20 and 22 to 31 were rejected under 35 USC 103(a) as being unpatentable over US patent number 4,725,317 to Wheeler, in view of newly cited US patent number 4,820,552 to Espinosa-C et al.

Wheeler describes a standard method of ball milling metal powder in an organic liquid, such as mineral spirits. The main focus of Wheeler is however the formation of a paste of the thus-formed metal flake pigment with an organic binder. The Examiner argues that it would have been obvious to replace the mineral spirits in the initial milling step of Wheeler with, for example, glycols, on the basis of the teaching of Espinosa-C. However, Applicant respectfully submits that the subject matter of claim 1 as presently amended is not obvious from the teaching of the prior art.

Claim 1 has been amended to require that the milling fluid as a whole must be both solvent and water miscible. This feature is neither taught nor suggested by the prior art. Wheeler exemplifies mineral spirits as a milling fluid.

The only example of Espinosa-C uses a mixture of benzene trichloride and diethylene glycol. The examiner must also take into account the solubility of these two solvents. From Wikipedia: "Diethylene glycol (DEG) is an organic compound described by the structural

formula $\text{HO}-\text{CH}_2-\text{CH}_2-\text{O}-\text{CH}_2-\text{CH}_2-\text{OH}$. It is a clear, hygroscopic, odorless liquid. It is 100% soluble in water and miscible with polar organic solvents such as alcohols and ethers."

Solubility in hydrocarbons is virtually zero; e.g. heptane 0.03% (see

http://www.meglobal.biz/literature/product_guides/MEGlobal_DEG.pdf).

For benzene trichloride, alias trichlorobenzene, solubility of the various isomers is limited to ether, or ether and benzene. It is water insoluble. (Ref. Handbook of Physics & Chemistry, 69th Edn., 1988-89, page C-118, ISBN 0-8493-0469-5.)

There is no suggestion in Wheeler or Espinosa-C that these milling fluids are both solvent and water miscible, and indeed one skilled in the art would recognize that they are not.

The prior art is merely concerned with conventional milling processes. Thus, as described above, Wheeler refers to a known milling step that can be integrated with further steps of the invention described therein (column 2, lines 19 to 20). Espinosa-C refers to milling vehicles that are conventionally employed (column 2, lines 21 to 24), and goes on to describe that desirable liquid vehicles are those which have lower vapor pressure, higher flashpoint, higher distillation range, are non-toxic and have lesser explosion hazards in the grinding operation (column 2, lines 29 to 31). Thus there is no suggestion in either Wheeler or Espinosa-C that the milling fluid should be one that is both solvent and water miscible.

The basis of the present invention is that the inventors realized that the need for a more convenient product could be met by grinding metal powders in a milling fluid that is both solvent and water miscible. As described at page 3, lines 29 to 31 of the present application, an advantage of using such a milling fluid is that one product can be employed in both solvent-based and water-based coatings, resulting in reduced stockholding for the customer. This would not have been obvious from the prior art, because neither Wheeler nor Espinosa-C contemplates the same problem. Wheeler is concerned with addition of an organic binder to the product of the milling process, and Espinosa-C is concerned with a further step of coating the metal particles with metal oxides. Neither of these prior art processes requires that the milling fluid be both solvent and water miscible.

The completion of the present invention does not simply involve a substitution of one type of milling fluid for another, functionally equivalent, substance, because the present invention requires selection of specific substances to ensure that the milling fluid is both solvent and water miscible. Espinosa-C does not suggest selection of a solvent and water miscible milling fluid, because in the only Example the milling fluid as a whole is not water-soluble. The Examiner will note also that glycols have been deleted from the milling fluids recited in claim 1, and therefore the subject matter of the claims is distinguished further from Espinosa-C.

With regard to claim 22, the Applicant respectfully submits that, as would be recognized by one skilled in the art, mineral spirits are not a type of mineral oil. Please see attached extract from The Condensed Chemical Dictionary, 10th Edn, revised by Gessner G. Hawley, 1981, Van Nostrand Reinhold Co. Inc., ISBN 0-442-23244-6, which provides separate definitions for mineral oil and mineral spirits. Both are types of hydrocarbons, with mineral oil being of significantly higher molecular weight than mineral spirits. Thus mineral oil has lubricating properties (and so is suitable for use as a lubricant according to claim 22), while mineral spirits do not. Indeed, if mineral spirits was a lubricant, there would be no need to add one to traditional formulations.

In addition to the rejection discussed above, the Office Action contains a rejection of claim 14 over the combination of Wheeler in view of Espinosa-C and Romano, Jr et al, or Wheeler in view of Espinosa-C and Okutsu et al. Furthermore, claims 3, 10 to 11 and 21 are rejected over the combination of Wheeler in view of Espinosa-C and Kramer et al. These dependent claims are not obvious in view of the combination of Wheeler and Espinosa-C for the same reasons as discussed above for claim 1 and because the limitations of an independent claim are incorporated in their dependent claims. MPEP §2143.03 citing *In re Fine*, 5 USPQ2d 1596 (Fed. Cir. 1988). Furthermore, the combination with Romano, Okutsu or Kramer is not proper, because none of these documents are concerned with grinding of metal pigments. They are therefore not concerned with the same technical considerations as the present invention.

Thus Applicant respectfully submits that, for at least the reasons above, the subject matter of the present claims would not have been obvious from any of the cited prior art, alone or in combination.

For the above reasons it is respectfully submitted that the claims define inventive subject matter. The examiner is invited to contact the undersigned if any further information is required.

Respectfully submitted,

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